**A Study of the speciation in sunflower populations & bee populations and the distinct speciation mechanisms occurring.**

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**Abstract**

The types and effects of speciation among sunflower populations and bee populations were studied in this experiment. Data analyzed included percentages of viable offspring for same-population crosses and different-population crosses for each species. In sunflowers, all populations were found to be distinct species except for 2 populations that showed high viability from their cross-population mating. REPEAT FOR BEE POPULATION USING RESULTS/ANALYSIS FINDINGS. In sunflowers, gametic isolation proved to be the most influential followed by mechanical and lastly temporal. REPEAT FOR BEE POPULATION USING RESULTS/ANALYSIS FINDINGS.

**Introduction**

Speciation is the process in which… LOOK IT UP Sympatric speciation can occur when…LOOK IT UP, while allopatric speciation can occur when…LOOK IT UP

The purpose of this study is to examine whether or not speciation is occurring in 4 sunflower populations and 4 bee populations; if speciation is observed, we wish to identify if any distinct speciation mechanisms have more significant effects than others. The null hypotheses for each species are:

There will be no difference in offspring viability among same populations and intercrossed populations.

There will be no difference in offspring viability among any speciation mechanisms observed.

**Materials & Methods**

Features of the sunflower populations were observed, including pollination season, habitat & reproductive structure measurements. Features of the bee populations were also observed including breeding season, mating rituals, habitat & reproductive structure measurements. Samples of 4 populations of each species were brought to a facility where reproductive crosses were performed. The resulting reproductive cross offspring viability was recorded and statistically analyzed by graphing the results & measuring statistical significance using graph error bars.

Experimental controls included using the same environmental conditions in each experimental habitat, such as lighting, temperature, nutrients provided and measurement procedures.

Baseline data for determining if cross results differed between same-population crosses and different-population crosses was achieved by comparing all different-population crosses with the observed same-population cross results, establishing what the usual same-population cross viability percent was.

**Results & Analysis**

Include your data tables here. You can combine the 2 tables from p. 3 into 1 table, and the same for the tables on p.4.

Next include your page with graphs, all of which should have a unique figure number, title specifying the population, axes labeled appropriately, and legends. Include a summary of the experimental trends in EACH graph. For example, Figure 1 (Crosses for sunflower population “A”) can be summarized by stating: “*All different-population crosses showed no viable offspring when “A” was the female but did show varying levels of offspring viability when “A” was the male”.* You should have 8 graphs, labeled Figures 1-8 each with a summary as modeled above.

Analyzing the data requires you to go over the null hypotheses for EACH population in light of your data & statistical outcome and explain if it makes “biological sense”. An example for the sunflower population “A” is below and I suggest you use its format:

“*Figure 1 clearly demonstrates that populations B, C & D are statistically different from population A as evidenced by no overlap between error bars for their data with the population A data. Table 1 shows that the usual mechanism of speciation when “A” was the female was gametic isolation. When “A” was the male however, different mechanisms of speciation took place such as mechanical & temporal isolation. By comparing the error bars between all crosses that showed only 1 speciation mechanism as the cause, there was no overlap and thus they can be considered statistically different in their effects on speciation. While these mechanisms can all prevent breeding, gametic had the strongest influence followed by mechanical and lastly temporal. These results are logical because if sperm and egg cannot recognize each other, there can be no offspring ever due to gametic isolation. Mechanical isolation may only occur in some members because the measurements of reproductive structures were averages. Temporal isolation is due to seasonal differences so reproductive barriers like hormone-secretion timing may change easily when exposed to mates ready to breed or the presence of pollinators.”*

After you have done this for each graph, end with a sentence or two about what can be done in the future as an extension or to reduce error…

*“The results from this experiment all demonstrated logical patterns for both species. While not explored in this experiment, it would be of interest to determine if the mutualistic relationship among the sunflowers & bees also plays a role in their speciation.*